If $p>n$, then, since there can be but n different ways of voting, n will be the number of different ways the voting may result.

If $p<n$, then since p persons can prepare only p states of the poll, p will be the number of different ways the voting may result.

Also solved by *H. C. Whitaker.*

GEOMETRY.

Conducted by B.F.FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

40. Proposed by J. C. CORBIN, Pine Bluff, Arkansas.

If R, r, r_1, r_2, and r_3 be, respectively, the radii of the circumscribed, inscribed, and escribed circles of a $\triangle$, prove $r_1+r_2+r_3-r=4R$.

Solution by M. A. GRUBER. War Department, Washington, D. C.

From any $\triangle$ whose sides are a, b, and c, we obtain $R=\dfrac{abc}{4\triangle}$,

$$r=\frac{\triangle}{s},\ r_1=\frac{\triangle}{s-a},\ r_2=\frac{\triangle}{s-b},\text{ and } r_3=\frac{\triangle}{s-c}.$$

$$\therefore\quad r_1+r_2+r_3-r=\frac{\triangle}{s-a}+\frac{\triangle}{s-b}+\frac{\triangle}{s-c}-\frac{\triangle}{s}=\frac{2s^3-as^2-bs^2-cs^2+abc}{\triangle}$$

$$=\frac{s^2[2s-(a+b+c)]+abc}{\triangle}=\frac{abc}{\triangle}.\quad\text{But }\frac{abc}{\triangle}=4R.\quad\therefore\quad r_1+r_2+r_3-r=4R.$$

We might appropriately add a few other combinations of these radii.

$$(1)\ \frac{1}{r_1}+\frac{1}{r_2}+\frac{1}{r_3}=\frac{1}{r};\ (2)\ rr_1r_2r_3=\triangle^2;\ (3)\ Rrr_1r_2r_3=\frac{abc\triangle}{4}.$$

Solutions of this problem were received from *G. I. Hopkins*, *E. W. Morrell*, *P. S. Berg*, *G. B. M. Zerr*, *F. P. Matz*, *Cooper D. Schmitt*, *P. H. Philbrick*, *J. F. W. Scheffer*, *John B. Faught*, and the *Proposer*. H. C. Whitaker did not solve the problem but referred to Chauvenet's Geometry and Hallowell's Geometrical Analysis, p. 225.

41. Proposed by F. P. MATZ, M. Sc.. Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Find the length (x) of a rectangular parallellopiped $b=5$ft., and $h=3$ft., which can be *diagonally inscribed* in a similar parallelopiped $L=83$ft., $B=64$ft, and $H=50$ft.